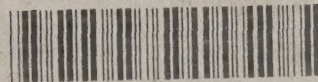


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INSTRUCTION BOOK

MODEL 1210A

NULL DETECTOR AND V.T.V.M.

FREED TRANSFORMER CO. INC.

INSTRUMENT DIVISION

INSTRUCTION MANUAL

FREED TRANSFORMER CO., INC.

1718 WEIRFIELD ST., BROOKLYN (RIDGEWOOD) 27, N. Y.

MP MASTER



MA34270



INSTRUCTION BOOK

MODEL 1210A

NULL DETECTOR AND V.T.V.M.

FREED TRANSFORMER CO. INC.

INSTRUMENT DIVISION

NULL DETECTOR-V.T.V.M.
MODEL 1210-A

SPECIFICATIONS

NULL DETECTOR

INPUT IMPEDANCE- 1 MEGOHM IN PARALLEL WITH 20 MMFD. CAPACITANCE.

GAIN- 98 DB AT 1KC.

FREQUENCY RANGE- SEE CURVE.

NULL DETECTOR SENSITIVITY- AT 1KC, 100 MICROVOLTS WILL GIVE A 15% METER DEFLECTION WITH THE FUNCTION SWITCH IN THE "LOG" POSITION; 30% WITH THE FUNCTION SWITCH IN THE "LIN" POSITION.

→ HUM AND NOISE LEVEL- WITH THE SELECTIVE FILTERS OUT, LESS THAN 60 MICROVOLTS REFERRED TO THE INPUT; WITH THE 1000 CYCLE SELECTIVE FILTER LESS THAN 5 MICROVOLTS. (MEASURED WITH INPUT TERMINALS SHORTED, GAIN SETTING MAXIMUM)

TUBES- THE FOLLOWING TUBES ARE REQUIRED AND SUPPLIED WITH THE INSTRUMENT:

2-6AU6, 1-6BA6, 1-12AU7

OPERATING INSTRUCTIONS

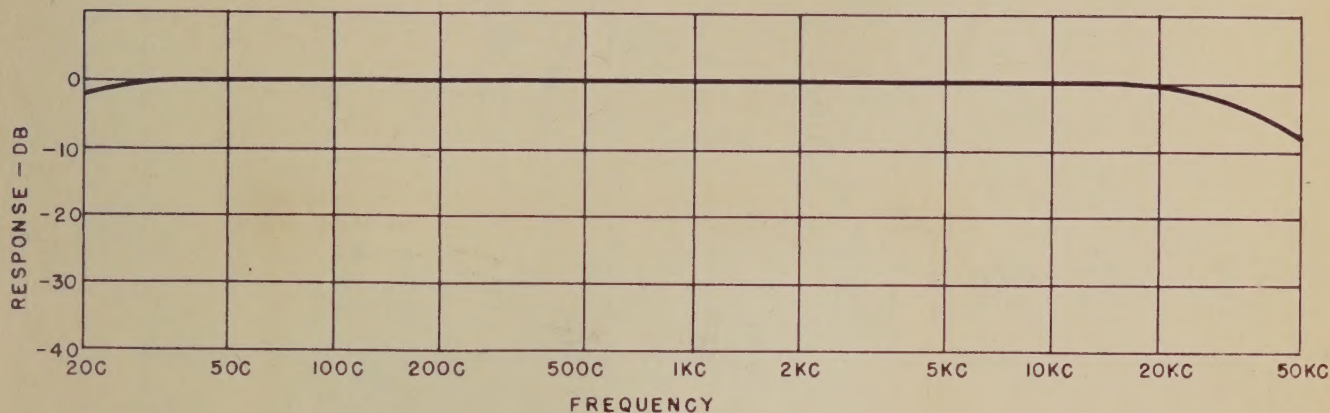
THE INSTRUMENT IS READY TO OPERATE AS RECEIVED. PLUG THE INSTRUMENT INTO THE AC POWER LINE (105-125 VOLTS, 50 TO 60 CYCLES) AND TURN THE POWER SWITCH TO THE ON POSITION. A PILOT LIGHT IS PROVIDED TO INDICATE WHEN THE POWER IS ON.

NULL DETECTOR- TO USE THE NULL DETECTOR CONNECT BRIDGE OR OTHER SOURCE TO INPUT TERMINALS. FOR COMPLETE SHIELDING, A SHIELDED PLUG AND INPUT CABLE SHOULD BE USED. SET THE FUNCTION SWITCH TO THE SCALE SET POSITION AND ADJUST THE SCREW DRIVER ADJUST UNDER THE METER UNTIL THE METER READS FULLSCALE. THEN SET FUNCTION SWITCH TO "LOG" POSITION OR "LIN" POSITION. IN THE "LOG" POSITION THE RESPONSE OF THE METER CIRCUIT IS APPROXIMATELY LOGARITHMIC OVER A 40 DB VOLTAGE RANGE. IF A LINEAR METER INDICATION IS DESIRED THE FUNCTION SWITCH SHOULD BE IN THE "LIN" POSITION. FOR MOST BRIDGE APPLICATIONS THE "LOG" DETECTOR SHOULD BE USED, BUT IF SMALL CHANGES IN LARGE UNBALANCING POTENTIALS ARE TO BE NOTED THE "LIN" DETECTOR SHOULD BE USED.

TO PREVENT OVERLOADING OF THE AMPLIFIER THE INPUT ATTENUATOR SHOULD BE IN THE -30DB POSITION WHEN VOLTAGES ABOVE 1 VOLT ARE APPLIED TO THE INSTRUMENT.

THE ROTARY SWITCH LABELED "FILTER" INSERTS SELECTIVE CIRCUITS TUNED TO 60, 400, AND 1000 CYCLES INTO THE AMPLIFIER CIRCUIT. IN THE "EXT" POSITION A TUNED LC CIRCUIT WITH AN IMPEDANCE OF 27,000 OHMS MAY BE CONNECTED TO THE FILTER JACK. (USING AN AMPHENOL TYPE 80MC-2M JACK). IN THE OUT POSITION OF THE FILTER SWITCH, THE NULL DETECTOR HAS A WIDE FREQUENCY RESPONSE.

THE ROTARY SWITCH LABELED "FILTER" INSERTS SELECTIVE CIRCUITS TUNED TO 60, 400 AND 1000 CYCLES INTO THE AMPLIFIER CIRCUIT. IN THE "EXT" POSITION A FREED TYPE 1940 INTERSTAGE FILTER MAY BE USED. THIS WILL PROVIDE SELECTIVITY AT ANY FREQUENCY BETWEEN 50 μ AND 20KC. IN THE OUT POSITION OF THE FILTER SWITCH, THE NULL DETECTOR HAS A WIDE FREQUENCY RESPONSE.



VACUUM TUBE VOLTMETER

INPUT IMPEDANCE: 50 MEGOHMS IN PARALLEL WITH 25 MMFD.

FREQUENCY RESPONSE: 20cps-200KC ± 1 DB 50cps-50KC,
20cps-200KC ± 2 DB.

TUBES: THE FOLLOWING TUBES ARE REQUIRED AND SUPPLIED
WITH THE INSTRUMENT- 3-6C4, 1-6AK5, 1-6AQ5.

POWER SUPPLY- 1-6X4, 2-OB2 ARE SUPPLIED WITH THE INSTRUMENT.

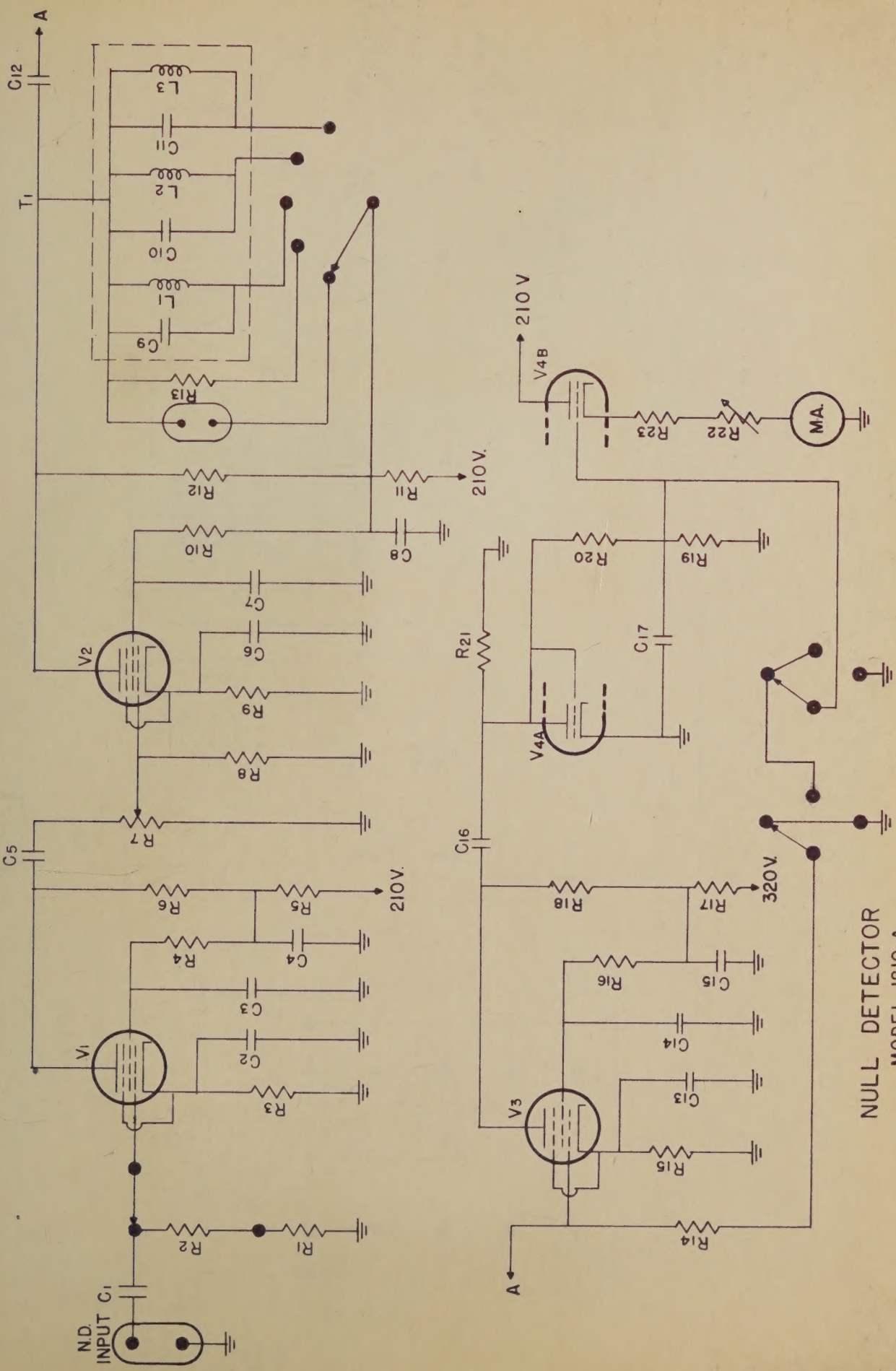
TO USE THE VOLTMETER CONNECT THE SOURCE TO THE TERMINALS MARKED VTVM INPUT.

CAL. OF VOLTMETER → TO CALIBRATE THE VOLTMETER ALLOW A 10 MINUTE WARM-UP PERIOD, THEN CONNECT A STANDARD VOLTMETER AND A SIGNAL SOURCE ACROSS THE VTVM INPUT TERMINALS, THEN ADJUST THE FULL SCALE SCREW DRIVER ADJUSTMENT BELOW THE METER UNTIL THE TWO METER READINGS AGREE [THE STANDARD AND THE VTVM]. THIS ADJUSTMENT MAY BE MADE WHILE THE METER RANGE SWITCH IS ON ANY OF THE FIRST THREE POSITIONS. TO CALIBRATE THE 100 VOLT RANGE, SET THE RANGE SWITCH ON 10 VOLTS POSITION AND ADJUST OSCILLATOR UNTIL METER READS FULL SCALE; THEN SWITCH TO 100 VOLT RANGE AND ADJUST RANGE ADJUST ON TOP OF THE CHASSIS UNTIL THE METER READS 1. THIS ADJUSTMENT IS ONLY NECESSARY AFTER THE 6C4 CATHODE FOLLOWERS HAVE BEEN REPLACED.

SPECIFICATIONS

TOTAL POWER CONSUMPTION - 70 WATTS

DIMENSIONS - 19" x 9 1/4" x 8 3/4" HIGH AND CAN BE RACK MOUNTED.

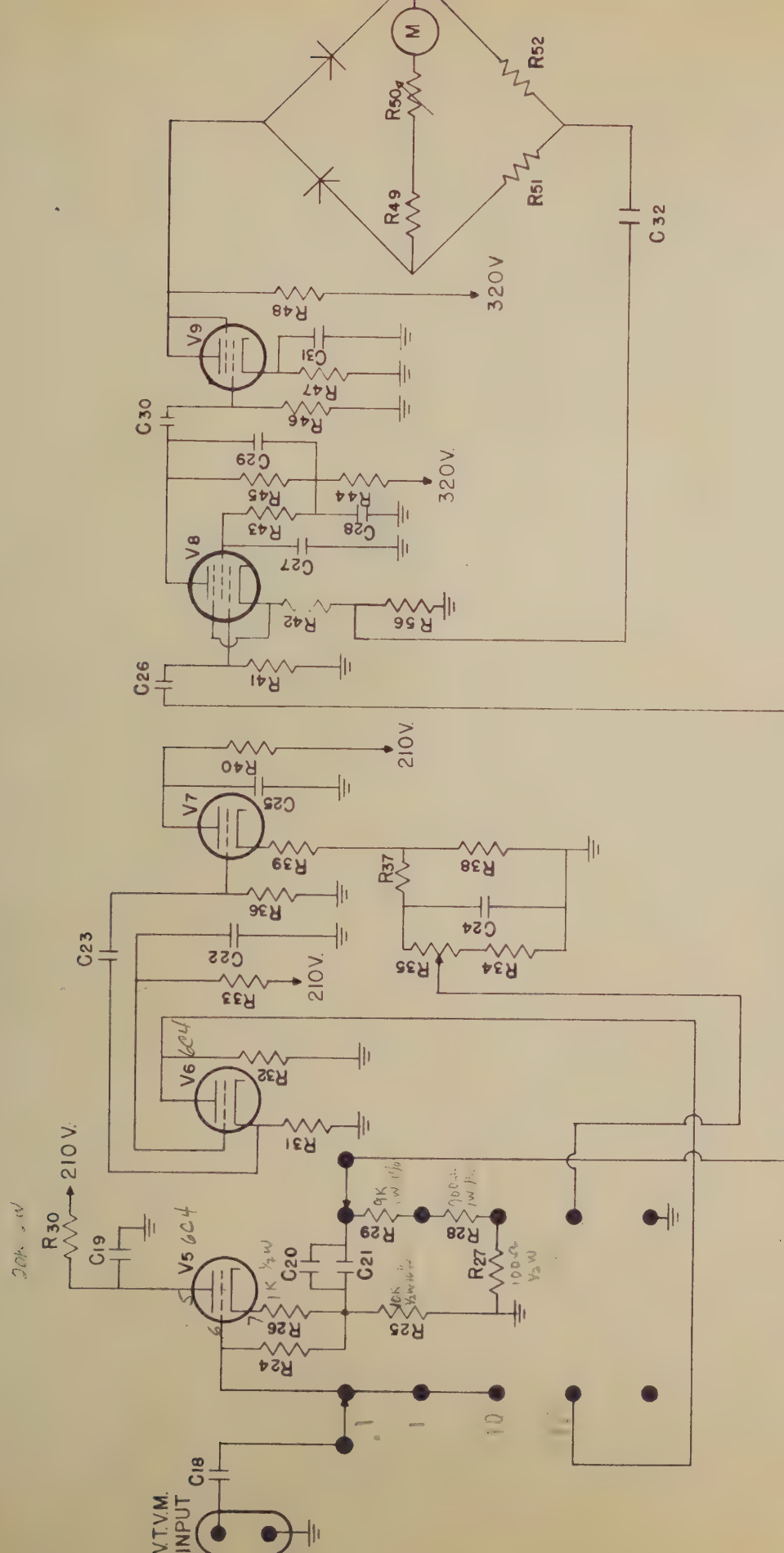


NULL DETECTOR
MODEL 1210-A

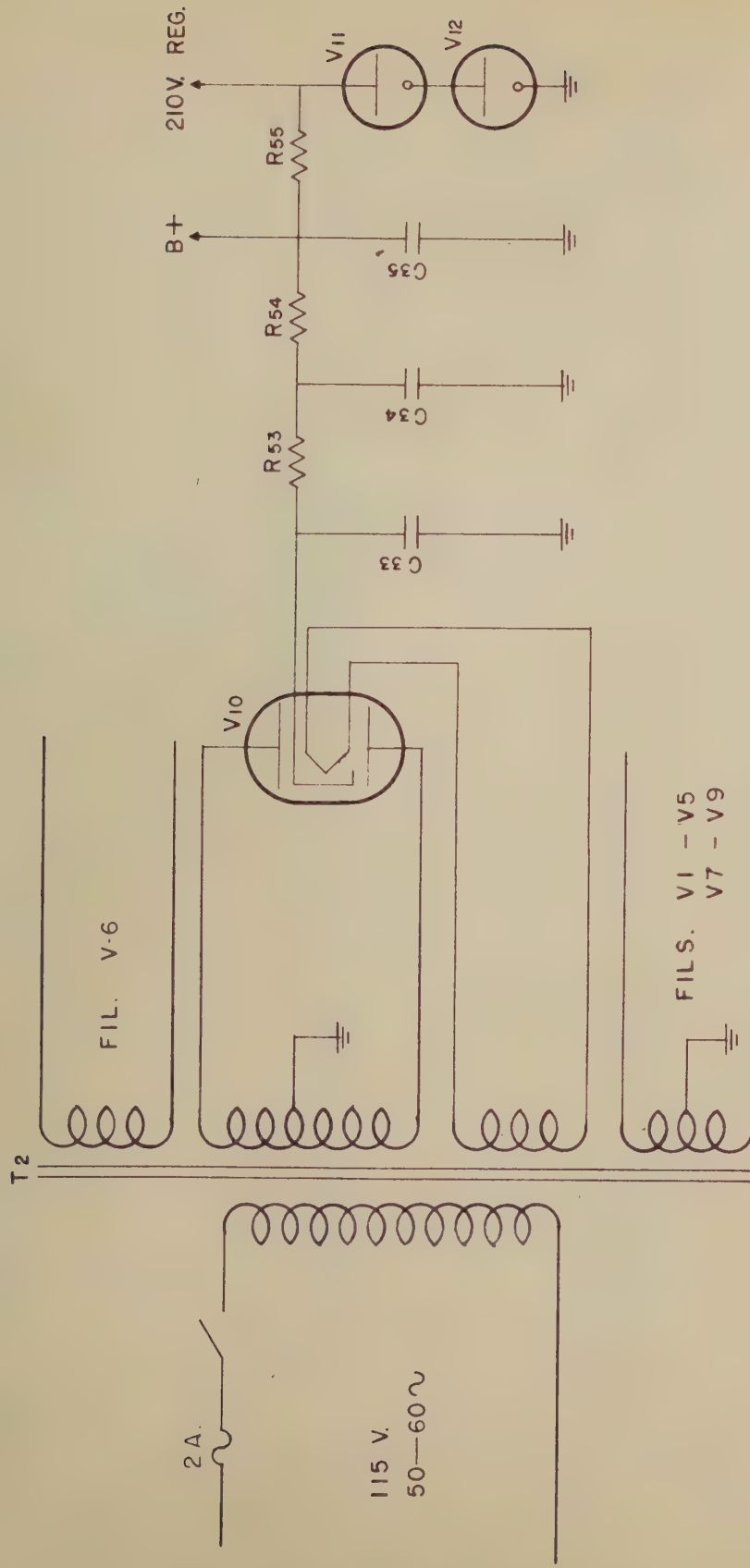


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VACUUM TUBE VOLTMETER
MODEL 1210—A



POWER SUPPLY FOR
NULL DETECTOR & V. T. V. M.

PARTS LIST

RESISTORS

R-1	33K	1/2w	±10%
R-2	1 MEG	1/2w	±10%
R-3	2.2K	1/2w	±10%
R-4	220K	1/2w	±10%
R-5	47K	1/2w	±10%
R-6	27K	1/2w	±10%
R-7	500K	2w	POTENTIOMETER
R-8	1 MEG	1/2w	±10%
R-9	220 OHMS	1/2w	±10%
R-10	220K	1/2w	±10%
R-11	47K	1/2w	±10%
R-12	470K	1/2w	±10%
R-13	27K	1/2w	±10%
R-14	470K	1/2w	±10%
R-15	680 OHMS	1/2w	±10%
R-16	270K	1/2w	±10%
R-17	10K	1/2w	±10%
R-18	47K	1/2w	±10%
R-19	220K	1/2w	±10%
R-20	470K	1/2w	±10%
R-21	470K	1/2w	±10%
R-22	10K	2w	POTENTIOMETER
R-23	7.5K	1/2w	±10%
R-24	22 MEG	1/2w	±10%
R-25	10K	1/2w	±10%
R-26	1K	1/2w	±10%
R-27	100 OHMS	1/2w	±1%
R-28	900 OHMS	1w	±1%
R-29	9K	1w	±1%
R-30	20K	2w	±10%
R-31	100K	2w	±10%
R-32	50 MEG	1w	±10%
R-33	10K	1/2w	±10%
R-34	100 OHMS	1/2w	±10%
R-35	50 OHMS	2w	POTENTIOMETER
R-36	1 MEG	1/2w	±10%
R-37	330 OHMS	1/2w	±10%
R-38	330 OHMS	1/2w	±10%
R-39	680 OHMS	1/2w	±10%
R-40	20K	2w	±10%
R-41	470K	1/2w	±10%
R-42	100 OHMS	1/2w	±10%
R-43	220K	1/2w	±10%
R-44	4.7K	1/2w	±10%
R-45	47K	2w	±10%
R-46	470K	1/2w	±10%
R-47	680 OHMS	1w	±10%
R-48	25K	4w	±10%
R-49	27K	1/2w	±10%
R-50	5K	2w	POTENTIOMETER

R-51	10K	1W	±10%
R-52	10K	1W	±10%
R-53	500 OHMS	5W	±5%
R-54	500 OHMS	5W	±5%
R-55	4K	10W	±5%
R-56	10 OHMS	1/2W	±10%

CAPACITORS

C-1	.1 MFD	PAPER	400 VOLTS
C-2	20 MFD	ELECTROLYTIC	25 VOLTS
C-3	20 MFD	ELECTROLYTIC	450 VOLTS
C-4	20 MFD	ELECTROLYTIC	450 VOLTS
C-5	.1 MFD	PAPER	400 VOLTS
C-6	100 MFD	ELECTROLYTIC	50 VOLTS
C-7	10 MFD	ELECTROLYTIC	450 VOLTS
C-8	10 MFD	ELECTROLYTIC	450 VOLTS
C-9	COMPONENTS OF FILTER 24563		
C-10	COMPONENTS OF FILTER 24563		
C-11	COMPONENTS OF FILTER 24563		
C-12	.1 MFD	PAPER	400 VOLTS
C-13	100 MFD	ELECTROLYTIC	50 VOLTS
C-14	10 MFD	ELECTROLYTIC	450 VOLTS
C-15	10 MFD	ELECTROLYTIC	450 VOLTS
C-16	.1 MFD	PAPER	400 VOLTS
C-17	.33 MFD	PAPER	200 VOLTS
C-18	.003 MFD	MICA	400 VOLTS
C-19	10 MFD	ELECTROLYTIC	450 VOLTS
C-20	8 MFD	ELECTROLYTIC	450 VOLTS
C-21	.1 MFD	PAPER	400 VOLTS
C-22	15 MFD	ELECTROLYTIC	450 VOLTS
C-23	.1 MFD	PAPER	400 VOLTS
C-24	ADJUSTED AT FACTORY		
C-25	15 MFD	ELECTROLYTIC	450 VOLTS
C-26	.056 MFD	PAPER	200 VOLTS
C-27	10 MFD	ELECTROLYTIC	450 VOLTS
C-28	10 MFD	ELECTROLYTIC	450 VOLTS
C-29	ADJUSTED AT FACTORY		
C-30	.1 MFD	PAPER	400 VOLTS
C-31	60 MFD	ELECTROLYTIC	50 VOLTS
C-32	2 MFD	BATHTUB	400 VOLTS
C-33	10 MFD	ELECTROLYTIC	450 VOLTS
C-34	15 MFD	ELECTROLYTIC	450 VOLTS
C-35	15 MFD	ELECTROLYTIC	450 VOLTS

TRANSFORMERS

T-1	FILTER TRANSFORMER, FREED No. 24653
T-2	POWER TRANSFORMER, FREED No. 25626

TABLE OF VOLTAGE READINGS

TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V1 6AU6		2.1	HEATER	HEATER	135	75	2.1		
V2 6AU6		.3	HEATER	HEATER	115	35	3		
V3 6BA6		2.5	HEATER	HEATER	185	55	2.5		
V4 12AU7	0	0	0	HEATER	HEATER	210		12	HEATER
V5 6C4	130	0	HEATER	HEATER	130	0	45		
V6 6C4	0	0	HEATER	HEATER	0	182	177		
V7 6C4			HEATER	HEATER					
V8 6AK5	0		HEATER	HEATER					
V9 6J6	0		HEATER	HEATER					
V10 6X4	325 AC		HEATER	HEATER		325 AC	370		
V11 OB 2		105			210				
V12 OB 2		0			105				

ALL D.C. VOLTAGES MEASURED TO GROUND WITH 20,000 OHM/VOLT METER.
ALL A.C. VOLTAGES MEASURED TO GROUND WITH 1,000 OHM/VOLT METER.

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